

IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Gomez, et al.

Application No.: 09/998,799

Filing Date: October 31 2001

Title: OPTIMIZED SERVICING THAT ADAPTS PREVENTATIVE AND CORRECTIVE ACTIONS  
TO THE LIFE OF A PRINTHEAD

Confirmation No.: 5959

Examiner: Ly T. Tran

Group Art Unit: 2853

Mail Stop Appeal Brief-Patents  
Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

(in triplicate)  
Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed  
on Sept. 1, 2004.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$340.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

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( ) three months	\$980.00
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(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is  
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Respectfully submitted,

Gomez, et al.

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicants:	Gomez et al.	)	
Serial No.:	09/998,799	) Art Unit:	2853
Filing Date:	October 31, 2001	) Examiner:	Tran, Ly T.
Title:	OPTIMIZED SERVCING THAT ADAPTS PREVENTATIVE AND CORRECTIVE ACTIONS TO THE LIFE OF A PRINthead	) Confirmation ) No.:	5959

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**Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450**

**APPELLANTS' APPEAL BRIEF**

Dear Sir:

This is an appeal from the Final Rejection of Claims 1-23 by the Primary Examiner in Art Unit 2853 on June 3, 2004.

Jurisdiction of this appeal results in the Board of Patent Appeals and Interferences under the provisions of Section 134, Title 35, United States Code, by way of a Notice of Appeal and requisite fee mailed to the USPTO with Certificate of Mailing on September 1, 2004.

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(1) **REAL PARTY IN INTEREST**

The real party in interest in this Application is the assignee, Hewlett-Packard Company, P.O. Box 272400, Fort Collins, CO 80527-2400.

(2) **RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

(3) **STATUS OF CLAIMS**

- (a) Claims canceled: None.
- (b) Claims withdrawn from consideration: None.
- (c) Claims pending: Claims 1-23.
- (d) Claims allowed: None.
- (e) Claims rejected: Claims 1-23.
- (f) Claims on appeal: 1-23.

(4) **STATUS OF AMENDMENTS FILED SUBSEQUENT TO FINAL REJECTION**

No amendment has been filed subsequent to the final rejection..

(5) **SUMMARY OF THE INVENTION**

The present invention relates to printing apparatus and a method for determining service criteria for a printhead in a printer.

As noted in the specification at pages 2-4, an inkjet printer includes a pen that has an orifice plate with an array of nozzles. The pen is scanned back and forth in a print zone adjacent a media with the pen being controlled to selectively shoot or fire drops of ink onto the media to form an image thereon. The printing operation can be adversely affected by contaminant buildup on the orifice plate, accumulation of different colors of ink, dried ink and the like. For this reason, the orifice plate and nozzles are frequently cleaned with a spit, wipe, spit procedure. In some printers this procedure is performed at the end of a print job based on certain criteria such as the number of drops fired since the last procedure, the time a pen has been uncapped, upon a user request, when power has first been applied to the printer. Although procedures like the spit, wipe, spit procedure

are desirable to clean the pen, they contribute to (a) an increased print time and (b) a shorter pen life by degrading the surface of the orifice plate.

U.S. Patent No. 5,455,608 performs a nozzle health detection before a print job and performs a sequence of recovery procedures based on a fixed threshold of at least one nozzle remaining non-firing. That is, the pen is judged “able to print” or “unable to print” based solely on the number of nozzles either working or not working. The sequence continues until all nozzles are firing or until a predetermined number of procedures have been performed. The system may continue to run the procedure for other print jobs until the pen is fully recovered or replaced. This leads to an unacceptable loss of printer throughput and productivity as well as to orifice plate degradation.

At page 4, lines 3-12, it is noted that prior art service procedures on printheads are time consuming and are performed periodically. These procedures have a negative impact on printer throughput and the health of the printhead as well.

The present invention includes a processor 120 (Fig. 1) that uses a program (Fig. 8) to determine a calculated age of the printhead and to select a printhead service procedure for the printhead based on the calculated age. The printhead age is calculated at step 805 based on formulae such as those described on page 16 of the specification and takes into account any combination of the factors 810, 815, 820, 825, 830 and 835 shown in Fig. 8 and discussed in detail at pages 13-17 of the specification. Processor 120 at steps 840, 845, 850 and 855 then selects a service procedure 860, 865 or 870 to be performed on the printhead based on the calculated age.

In one embodiment of the apparatus and method of the present invention the calculated age is classified in a plurality of phases. For example, the plurality of phases may include two or more of a beginning of life phase, a middle of life phase and a maturity of life phase as shown by steps 840, 845 and 855 in Fig. 8.

(6) **ISSUES**

The issues presented for appellate determination by way of this Appeal are the propriety of the Final Rejection of the appealed Claims on the following grounds:

- (a) the rejection of Claims 1-20, 22 and 23 under 35 U.S.C. 102(b) as being unpatentable over U.S. Patent No. 6,361,138 to Seino et al., hereafter Seino, in view of U.S. Patent No. 5,459,496 to Hanabusa et al., hereafter Hanabusa.
- (b) the rejection of Claim 21 under 35 U.S.C 103(a) as unpatentable over Seino in view of Hanabusa as applied to Claim 1 and further in view of European Patent No. 1,034,935 to Brunch et al., hereafter Brunch.

(7) **GROUPING OF THE CLAIMS**

With respect to issue (a):

Claims 1 and 10 and their respective dependent Claims 2, 9, 20, 22 and 23 and 11, 18 and 19 stand or fall together.

Claims 3 and 12 and their respective dependent Claims 4-8 and 13-19 stand or fall together.

With respect to issue (b):

Claim 21 stands alone.



(8) **ARGUMENTS**

**Issue (a)**

**PTO'S POSITION**

The PTO's position concerning the rejection of Claims 1-20, 22 and 23 under 35 U.S.C. 103(a) is set forth at pages 2-5 of the final Office Action designated below:

**ARGUMENT 1.**

**Seino and Hanabusa lack the feature of selecting a service procedure based on the determined calculated age of the printhead.**

**DISCUSSION**

Seino discloses in Figs. 1-4B a printing apparatus that includes a black ink cartridge 1 and a color ink cartridge 2 that serve as ink reservoirs for a printhead 16 and a printhead 17, respectively. Ink cartridges 1 and 2 include storage systems 32 and 42, respectively, that contain factory specified data that is listed at column 3, lines 32-37.

Seino's printing apparatus also shows in Fig. 5 an ink cartridge replacement determination system 51 that responds to attachment or detachment of either ink cartridge 1 or 2 to provide a signal to a control system 53. Control system 53 responds to the signal by executing a program shown in Fig. 6 to control an operation based on the factory stored data in storage systems 32 or 34 as well as the position of a switch as noted at column 5, lines 22 and 23. The operation essentially determines whether the ink cartridge is suitable for the printing apparatus (step B), exceeds its expiration date (step C) and is identical to a previously used ink cartridge (Step F). The operation then causes the filling with ink of an associated printhead 16 or 17 based on the identity determination as well as the position of the above noted switch to prime the printhead for a printing operation at step K.

Seino's objective is to replace an ink cartridge that contains stale (degraded and/or gasified) ink. Seino makes this determination based on a factory supplied expiration date. If the expiration date has expired, the ink is deemed stale and the ink cartridge is replaced. That is, Seino wants to avoid use of ink that is stale or old enough to be degraded or gasified. Seino's expiration date really applies to the ink contained in the ink cartridge 1 or 2.

In contrast, the objective of the present invention is to improve the useful life of a printhead and not to replace it due to stale ink in an ink reservoir. The present invention achieves this objective by selecting service procedures for the printhead based on a calculated age of the printhead. As noted in the Summary of the Invention section above, the service procedures vary depending on the age of the printhead, varying from mild in early life, moderate in middle life to strenuous in later life. By using less strenuous service procedures in early life, the useful life of the printhead is prolonged.

The technical fields for ink and printheads are quite different and involve quite different technical issues and solutions. Thus, the stale ink cartridge art of Seino is non-analogous to the printhead servicing art of the present invention.

The Examiner alleges that the step of selecting a service procedure reads on Seino's step F in Fig. 6 and the passage at column 4, line 56, to column 5, line 27. Step F determines if the "identity" of the newly installed ink cartridge is identical to the identity of an ink cartridge that was previously attached to the printhead. Step F does not use a calculated age in its determination. In fact, step F reads the "identity" of the newly installed ink cartridge from the associated storage system 32 or 34 for comparison with the identities of all previously installed ink cartridges. This identity data is entirely different and distinct from the expiration date data used by step C. Therefore, Seino's step F does not select a procedure based on any age that might be determined by step C.

Based on step F's determination of ink cartridge identities, a selection is made to suck with ink by normal suction or to choose large-amount suction or middle-amount suction based on the determination of step H. Step H makes this choice based on whether an operator has designated a

refill by operating the above noted refill switch (column 4, lines 22 and 23). The reason for the choice is an operator-determined need for more or less degasifying of the printhead (column 4, lines 19-39).

Thus, Seino's step F selects a suction procedure based on an "identity" of ink cartridge identities and not on calculated age of the printhead as recited in Claims 1 and 10. Moreover, the selection of suction procedures by step H is based on an operator determination of whether more or less degasifying is needed and not on the calculated age of the ink cartridge as taught by Seino, and more importantly of the printhead as recited in Claims 1 and 10 of the present invention. Thus, Seino teaches that step F makes an ink cartridge identity determination that is used in combination with step H's detection of a refill indicated by a user operated switch to select a particular suction amount for the purpose of normal, middle-amount or large-amount for degassifying ink that is to be filled into the associated printhead.

Moreover, the G, I and J procedures in Fig. 6 of Seino are not service procedures, but rather are ink-filling procedures to prime the associated printhead with ink for printing in step K. Therefore, Seino's step F, taken separately or in combination with steps G, H, I and J, does not select "service procedures", but rather selects ink filling procedures to prime a printhead for a printing operation.

The Examiner contends at page 5 of the final rejection that "age is equivalent to use. Refer to column 3, lines 47-49, Seino discloses that the ink capacity and number of times maintenance and the degree of each maintenance have been in the storage, and based on these information in the storage, suction is executed."

This contention is traversed. The data mentioned at column 3, lines 47-49, is not used in the determination made by either step C or step F. Rather, step C uses the factory supplied expiration date and step F uses the factory supplied identity of the ink cartridge. Step C merely compares a current date with the expiration date of the ink cartridge, which was stored in the ink cartridge memory at the time of factory shipment. In fact, the column 3, line 47-49, data is not even read from the ink cartridge memory for the determinations made by steps B and C. The data read for these

determinations is described at column 4, lines 59-62, as “manufacturing date, the expiration date, the data for specifying adaptable printing apparatuses, the ink capacity, etc., of the ink cartridge, which were previously stored at the factory shipment”. Therefore, the Examiner’s contention that based on the data described in column 3, lines 47-49, the suction is executed is incorrect. Rather, the suction of step G is made based on the determination of step F, which is a comparison of the identity of the current ink cartridge with identities of previously attached ink cartridges. Therefore, step F makes no determination based on an age or use of the ink cartridge or its associated printhead.

Furthermore, “age is not equivalent to use” in Seino. For example, a new unused ink cartridge, which has already exceeded its expiration date, would be rejected by Seino’s step C. That is, step C merely makes a determination of whether the current date exceeds the expiration date of the ink cartridge. This determination has nothing to do with use as illustrated by this example in which the ink cartridge is unused and rejected.

Moreover, the impermissible and improper Seino/Hanabusa combination would perform steps F, G, H, I and J according to Seino’s teaching as discussed above in this Argument to determine if the ink cartridge is identical to any ink cartridge previously used in the printer and to fill the printhead with ink to prime the printhead to perform the printing operation of step K. As discussed above, the ink filling operations of steps G, I and J are merely ink filling procedures to prime the printhead for printing and are not service procedures. As discussed above, Seino’s step F does not select a service procedure based on a calculated age of a printhead as claimed by independent Claims 1 and 10. Therefore, the Seino/Hanabusa combination also does not select a service procedure based on a calculated age of a printhead as recited in independent Claims 1 and 10.

Since Seino and Hanabusa, either alone or in combination, lack the feature of selecting a service procedure based on the determined calculated age of the printhead, Claims 1 and 10 and their respective dependent Claims 2, 9, 20, 22 and 23 and 11, 18 and 19 are not obvious in view of the combination. Therefore, the Final Rejection of Claims 1, 2, 9-11, 18-20, 22 and 23 under 35 U.S.C. 103(a) is erroneous and should be reversed.

## **ARGUMENT 2.**

**Seino and Hanabusa lack the feature of determining a calculated age of the printhead.**

## **DISCUSSION**

The Examiner reads the step of determining a calculated age of the printhead on Seino's step C. Seino's step C is shown in Fig. 6 as determining whether a newly installed ink cartridge is within a permissible service life as indicated in Fig. 6. The activity of Fig. 6 is described beginning at column 4, line 58 as follows:

"The control system 53 reads the manufacturing date, the expiration date, the data for specifying adaptable printing apparatuses, the ink capacity, etc., of the ink cartridge, which were previously stored at the factory shipment, from the storage systems 32, 42 of the ink cartridge 1, 2 through data read and write system 50 to determine whether or not the ink cartridge is adaptable to the printing apparatus at steps B and C. If the ink cartridge 1, 2 is not adaptable to the printing apparatus or exceeds the expiration date, a message indicating that the ink cartridge 1, 2 cannot be used is displayed..."

Thus, Seino's step C merely reads a factory supplied expiration date and determines if it has been exceeded by the ink cartridge. For Seino's printer apparatus, this determination is needed because the expiration date is important to degradation and gasification of the ink contained in the ink cartridge or ink reservoir. If the expiration date has not been exceeded, the activity of the operation of Fig. 6 continues.

Seino is actually interested in avoiding use of ink for which an expiration date has expired. That is, Seino wants to avoid use of ink that is old enough to be degraded or gasified. Thus, Seino's expiration date really applies to the ink contained in the ink cartridge 1 or 2. Seino's step C determines that if the ink has exceeded its expiration date, it cannot be used. Thus, step C is confined to the ink. The fact that the ink is validated or not for printing by step C can hardly have any connection to a calculated age of the associated printhead 16 or 17, whether separate from the

ink cartridge as in Seino or combined as taught by Hanabusa. The ink and the printhead are in quite different technical fields with different technical issues. Any expiration date that makes sense for ink is irrelevant to a calculated age of a printhead for service procedure issues.

Seino's determination of whether an ink cartridge has exceeded its expiration date is not a determination of a calculated age, but rather is a determination of a greater than age of the ink itself. Moreover, Seino's step C determination is confined to the ink in the ink cartridge 1 or 2 and has nothing to do with the associated printhead.

The Examiner admits that Seino fails to teach the determination of a calculated age of the printhead as claimed. The Examiner alleges that it is known in the art that the ink cartridge is an integral part of the printhead as evidenced by Hanabusa, referring to column 1, lines 30 and 31 of Hanabusa. The Examiner then concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to extrapolate the age of a printhead from the calculation of the age of the ink cartridge as taught by Seino, since it is well known that the ink cartridge is an integral part of the printhead as taught by Hanabusa.

The Examiner's allegation that it is known in the art that the ink cartridge is an integral part of the printhead is hereby challenged. Hanabusa at column 1, lines 28 and 31, reads as follows:

As a result, fabrication of small-sized and inexpensive recording heads is being implemented, and removable type recording heads, which include an ink reservoir as their integral part, are being proposed.

Seino's teaching concerns a specific type of replaceable ink cartridge that contains an onboard storage system 32 or 34. Thus, the impermissible and improper combination of Seino and Hanabusa by the Examiner would still not teach or suggest a combination that includes a replaceable integral ink cartridge and printhead with integral storage system 32 or 34 to store the factory supplied data listed at column 3, lines 30-37. Assuming for argument sake that Seino and Hanabusa are properly combined, the combination would still only perform steps B and C according to Seino's teaching as discussed above, whereby such combination would only be able to determine if the ink

cartridge is suitable for use with the printer and if the ink in the ink cartridge has exceeded its expiration date. As discussed above, Seino's step C does not determine a calculated age as recited in independent Claims 1 and 10.

Since, Seino and Hanabusa, either alone or in combination, lack a determination of a calculated age of the printhead, independent Claims 1 and 10 and their respective dependent Claims 2, 9, 20, 22 and 23 and 11, 18 and 19 are not obvious in view of the Seino/Hanabusa combination. Therefore, the Final Rejection of Claims 1, 2, 9-11, 18-20, 22 and 23 under 35 U.S.C. 103(a) is erroneous and should be reversed.

### **ARGUMENT 3.**

#### **There is no motivation to combine Seino and Hanabusa.**

### **DISCUSSION**

The Examiner's suggestion to use Seino in combination with Hanabusa is improperly based on the hindsight of Applicants' disclosure. Such hindsight reconstruction of the art cannot be the basis of a rejection under 35 U.S.C. 103. There must be some teaching, suggestion, or modification to combine references. *In re Lee* 61 USPQ 2d 1430, 1433, 1434 (CAFC 2002). *In re Rouffet*, 47 USPQ 2d 1453, 1456 (CAFC, 1998). *In re Laskowski*, 871 F.2d 115, 117, 10 USPQ 2d 1397, 1398-1399 (CAFC, 1989). "The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made." *Sensonic Inc. v. Aerosonic Corp.* 38 USPQ 2d 1551, 1554 (CAFC, 1996), citing *Interconnect Planning Corp. v. Feil*, 774 F. 2d 1132, 1138, 227 USPQ 543, 547 (CAFC, 1985). There is no suggestion or motivation for one of ordinary skill in the art at the time the invention was made to use the integral ink cartridge and printhead as taught by Hanabusa in Seino.

Therefore, the Final Rejection of Claims 1, 2, 9-11, 18-20, 22 and 23 under 35 U.S.C. 103(a) is erroneous and should be reversed.

#### **ARGUMENT 4.**

**Seino and Hanabusa do not teach classifying the calculated age of a printhead as one of a plurality of phases.**

#### **DISCUSSION**

Since Claims 3 and 12 are dependent on Claims 1 and 10, it is submitted that Claims 3 and 12 and their respective dependent Claims 4-8 and 13-17 are not obvious in view of the Seino/Hanabusa combination for the reasons set forth in Arguments 1, 2 and 3 above.

The Examiner relies on the above quoted passage of Seino at column 4, lines 59-62, as disclosing the claimed classifying of the calculated age as one of a plurality of phases. However, this passage merely refers to the activities of steps B and C that make determinations based on the factory supplied data concerning printer suitability and expiration date for the ink cartridge. Neither of these determinations teach or suggest classifying a calculated age of the printhead as one of a plurality of phases. Therefore, neither Seino alone or in combination with Hanabusa teaches that the calculated age of the print head is classified as one of a plurality of phases as claimed in Claims 3 and 12 and their respective dependent Claims 4-8 and 13-17.

Therefore, the Final Rejection of Claims 3 and 12 and their respective dependent Claims 4-8 and 13-17 under 35 U.S.C. 103(a) is erroneous and should be reversed.

#### **Issue (b)**

#### **PTO'S POSITION**

The PTO's position concerning the rejection of claim 21 is forth at page 4 of the final Office Action.



## **ARGUMENT 1**

**Seino, Hanabusa and Brunch lack the combination recited in claim 21.**

## **DISCUSSION**

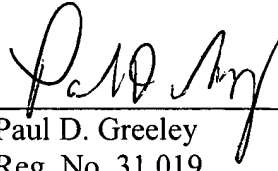
Since Claim 21 is dependent on Claim 1, it is submitted that Claim 21 is not obvious in view of the Seino/Hanabusa/Brunch combination because Brunch was not cited as disclosing any of the features that the combination of Seino and Hanabusa lacks, which were noted in the discussion of issue (a) above. Therefore, for the reasons set forth in Arguments 1, 2, 3 and 4 of issue (a) above, claim 21 is not obvious over the Seino/Hanabusa/Brunch combination.

Therefore, the Final Rejection of Claim 21 under 35 U.S.C. 103(a) is erroneous and should be reversed.

## **PRAYER FOR RELIEF**

Reversal of the Final Rejection of Claims 1-23 and an indication of the patentability of said Claims over the references is respectfully requested.

Respectfully submitted,

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## **APPENDIX**

### **(9) APPEALED CLAIMS**

A copy of the Claims on appeal is set forth in this Appendix.

1. A method of determining service criteria for a printhead in a printer comprising:  
receiving an indication that service is needed;  
determining a calculated age of said printhead; and  
selecting a service procedure based on the determined calculated age.
2. The method of claim 1, wherein said selected service procedure has an impact on the long term life of said printhead that is proportional to the calculated age.
3. The method of claim 1, further comprising classifying said calculated age as one of a plurality of phases.
4. The method of claim 3, wherein said plurality of phases include at least a beginning of life phase and a maturity phase.
5. The method of claim 3, wherein said plurality of phases include at least a beginning of life phase, a middle of life phase and a maturity phase.
6. The method of claim 5, wherein said selected service procedure for said beginning of life phase has a low impact on the long term life of said printhead.
7. The method of claim 5, wherein said selected service procedure for said middle of life phase has a moderate impact on the long term life of said printhead.
8. The method of claim 5, wherein said selected service procedure for said maturity phase has a severe impact on the long term life of said printhead.
9. The method of claim 1, wherein determining said calculated age comprises utilizing at least one factor selected from the group consisting of: volume of ink expelled, type of previous service

procedures, number of previous service procedures, types of previous failures, number of previous failures, time and number of print jobs printed.

10. An apparatus for determining service criteria for a printhead in a printer comprising:  
circuitry for receiving an indication that service is needed; and  
a processor for determining a calculated age of said printhead and selecting a service procedure based on the determined calculated age.
11. The apparatus of claim 10, wherein said selected service procedure has an impact on the long term life of said printhead that is proportional to said calculated age.
12. The apparatus of claim 10, further comprising circuitry for classifying said calculated age as one of a plurality of phases.
13. The apparatus of claim 12, wherein said plurality of phases include at least a beginning of life phase and a maturity phase.
14. The apparatus of claim 12, wherein said plurality of phases include at least a beginning of life phase, a middle of life phase and a maturity phase.
15. The apparatus of claim 14, wherein said selected service procedure for said beginning of life phase has a low impact on the long term life of said printhead.
16. The apparatus of claim 14, wherein said selected service procedure for said middle of life phase has a moderate impact on the long term life of said printhead.
17. The apparatus of claim 14, wherein said selected service procedure for said maturity phase has a severe impact on the long term life of said printhead.
18. The apparatus of claim 10, wherein said processor for determining said calculated age comprises utilizing at least one factor selected from the group consisting of: volume of ink expelled, type of previous service procedures, number of previous service procedures, types of previous failures, number of previous failures, time and number of print jobs printed.

19. The apparatus of claim 10, wherein said service procedure has a prolonging impact on the useful life of said printhead.
20. The method of claim 1, wherein said service procedure has a prolonging impact on the useful life of said printhead.
21. The method of claim 1, wherein said selected procedure services nozzles of said printhead that are selected based on a failed health thereof, then checks the health of said selected nozzles and repeats said selected service procedure if said printhead is determined to be operating inadequately.
22. The method of claim 1, wherein said service procedure is selected from a plurality of service procedures for curing a failure based on said calculated age.
23. The method of claim 1, wherein said service procedure is selected from a plurality of service procedures such that an intensity and a frequency of said service procedures increase corresponding to said calculated age.